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(54) Title: VESSEL FOR VACUUM FILLING DEFORMABLE CONTAINER

(57) Abstract

A container or vessel (5) suitable for use in the vacuum collection of fluid in a container (50) that would normally be deformed by the vacuum, the vacuum collection system including a fluid line (27) adapted to communicate with a source of the fluid and a vacuum line (21) for providing a vacuum. The container or vessel (5) is substantially non-deformable under a preselected vacuum and includes a base (7) and an opening (9) through which the container (50) may pass for containment of the container; a closure (11) adapted to sealingly close the opening (9); a fluid inlet port (13) for connection to the fluid line and a vacuum outlet port (15) for connection to the vacuum line.

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VESSEL FOR VACUUM FILLING DEFORMABLE CONTAINER

The present invention relates to a container or vessel suitable for use in the collection of fluids and is particularly concerned with a container or vessel suitable for use in the collection of quantities of fluid obtained by a vacuum collection system.

There are situations where there is a need to collect quantities of fluid for storage, transport or testing. Commonly containers are made of plastics such as polyethylene, polypropylene or PVC because of their relatively low cost and relatively low weight and re-usability. However most plastic containers are not sufficiently rigid to be used in a vacuum collection system as they tend to be deformed or crumpled on imposition of a vacuum within the container.

An instance of where vacuum collection is used is the collection of colostrum or milk from cows using a vacuum milking machine arrangement. Colostrum is the milk secreted by a mammal just before and for a short period after giving birth. The colostrum contains antibodies to protect offspring against disease. It is known to immunise animals such as cows with specific antigens and thereafter harvest antibody enriched colostrum from the animal. If this colostrum is to be collected, it must be carried out in such a manner that the colostrum is not contaminated or diluted by milk in the collection pipe and must be kept separate from other milk.

It is an object of the present invention to provide a container or vessel that allows vacuum collection of a fluid in a container that would normally be deformed by the vacuum.

Accordingly, the present invention provides a container suitable for use in the collection of a fluid using a vacuum collection system, the vacuum collection system including a fluid line adapted to communicate with a source of the fluid and a vacuum line for providing a vacuum, the container being substantially non-deformable under a preselected vacuum, the container including:

an opening through which a second container may pass for containment in the container,

a container closure adapted to sealingly close the container opening,

a fluid inlet port adapted to be connected to the fluid line; and

a vacuum outlet port adapted to be connected to the vacuum line.

The fluid to be collected may be a milk product, preferably colostrum.

It has been found that the container according to the present invention may permit collection of, e.g. colostrum, at very high cleanliness levels while
5 minimising the cleaning time to maintain acceptable levels of hygiene within, e.g. a dairy.

Such collection system is acceptable for example to pharmaceutical regulatory authorities.

The ability of the container of the invention to withstand the applied
10 vacuum may be achieved by appropriate selection of material and/or thickness of the wall(s) of the container. The material from which the container is made may include reinforcing material, for example fibres, filaments or powders, to provide the requisite mechanical strength. The walls(s) of the container may be formed from a number of materials such as a laminate of two or more layers. The
15 container may have reinforcing elements such as ribs, fins or the like to provide strength to the wall(s) thereof.

Preferably the container is formed from a material such as metal, plastic, glass or ceramic. Preferably the material from which the container is made can be kept clean by washing with water and is also resistant to degradation from
20 cleaning agents such as detergents and disinfectants. Preferably the container is formed from a steel, such as stainless steel, or polymer such as polypropylene although other materials having sufficient strength may be used.

The container may be formed from a material which is relatively clear, allowing observation of a second container located therein whilst it is being filled.
25 In this case, the container may be formed from a material such as a glass or plastic. Alternatively, the container may include one or more relatively clear portions which allow a second container located therein to be observed during filling.

The container of the invention may be of any shape as long as it can
30 accommodate a second container. The container may be cylindrical, for example, in the shape of cylindrical bucket, however, the container is not limited to having a circular cross section nor does it necessarily have a flat base. The container may

have a generally rectangular cross-section or one or more of the wall(s) of the container may be arcuate. The container may include means to allow the container to be moved such as wheels, castors or the like.

We have found that there is a tendency for a cleaning fluid such as water to collect on the bottom of the container. Bacteria can accumulate in this water residue providing a potential source of contamination of the fluid being collected in the second container, particularly when the vacuum is first applied to the container. To avoid this potential problem, the floor of the container of the invention may be sloped towards drain means. The drain means may be located at a side wall or in the floor at or adjacent a side wall of the container, at the centre of the floor, or between the centre and one or the side walls. The drain may be a hole or holes which can be closed so that a vacuum may be applied to the container. The drain means may include a valve, plug, diaphragm or other mechanism which is normally open under ambient pressure but is activated by application of vacuum to the container to close the drain.

The closure may be formed from any material which is substantially non-deformable under the vacuum used in the vacuum collection system. The closure may be of the same material as that of the container or it may be formed from a different material. The closure may be formed from a substantially non-deformable clear material or include a clear portion so as to allow the user to observe a second container located within the container of the invention being filled.

The closure itself may be capable of forming a substantially vacuum tight seal with the opening of the container or it may include a seal which may be formed of a resilient material such as a natural or synthetic rubber.

The inlet and vacuum ports may be located on the container closure or on the container itself.

Preferably the inlet port has a spout, pipe or the like extending into the body of the outlet of which may be located within, or in alignment with, the opening of a second container when located within the container of the present invention. Preferably the spout or pipe extends into the body of the container. Preferably the vacuum port communicates with a tube or pipe which may extend

into, or be located in, the body of the container. The pipe or tube may be rigid or it may be flexible such as a plastic tube. This tube or pipe may be of sufficient length to allow the free end thereof to be connected to the inlet port spout so as to provide a path for the line to be flushed with clean fluid. The container may
5 include means to hold the tube in place in the container such as a clip located on the inside of the container.

In a second aspect, the present invention provides a container of the first aspect including a second container located therein.

The second container preferably has wall(s) which are normally
10 deformable under applied vacuum to its interior. The second container may be formed from a non-rigid plastic material. The second container may be formed from PVC, polyethylene or polypropylene or any other suitable polymer.

The utilisation of such a lightweight second container permits ease of handling, transportation and re-usability. The second container may also be
15 stored at low temperatures. Optionally the liquid colostrum in the second container may be snap frozen.

The second container may also facilitate sampling of liquid or frozen fluid.

The second container may be of any shape. Preferably the second container has an opening, spout or other orifice which can be closed by a top,
20 plug or lid.

In a further aspect, the present invention provides a vacuum collection system, said system including the collection system of the second aspect of the invention wherein the inlet port is connected to the liquid line of a vacuum collection system and the vacuum port is connected to the vacuum line of said
25 system.

The vacuum collection system may be a vacuum milking system.

The method of the invention may be used to collect colostrum.

In yet a further aspect, the present invention provides a method for collecting a liquid in a container by means of a vacuum collection system, said
30 method including the use of a container in accordance with the first or second aspect of the present invention.

The method of the invention may be carried out using a plurality of containers in accordance with the invention.

In order that the invention may be more readily understood, the following non-limiting embodiments are provided.

5 Figures 1 and 2 illustrate an embodiment of the invention. The container 1 comprises a cylindrical stainless steel bucket 5 having a flat base 7 and an opening 9. The container is closed by a stainless steel lid 11 having an inlet port 13 and a vacuum port 15. The lid 11 incorporates a rubber or polyurethane seal 17 which prevents substantial loss of vacuum from the container when in use.

10 The vacuum port 15 may have a collar 19 which allows connection to the vacuum line 21 of a milking machine. The vacuum port, on the underside of the lid 11, includes a collar 23 to which may be attached a polyethylene tube 33. The polyethylene tubing may be used as a milk inlet return line as discussed below. The inlet port 13 has a collar 25 extending above the top of the lid 11 making
15 connection to the fluid line 27 of a vacuum milking machine.

A pipe or spout 29 extends from the inlet port downwardly from the bottom of the lid 11 and is positioned so that the outlet of the pipe is positioned in the spout 52 of plastic jerry can 50.

20 The container may have handles 31 to allow the container to be easily carried and lid 11 may have a handle 32 to facilitate removal of the lid from the container.

In order that the invention may be more readily understood, we now describe a particular use in collecting colostrum from one or more cows.

25 Before use the container may be cleaned. To clean, the milk line from the milking cluster (not shown) of a vacuum milking machine is attached to the short line 25, 13, 29 of the container whilst the vacuum line 21 is connected to the collar 19 of the vacuum port 15. The milking machine cluster is left attached to the jetter (not shown) of the milking system. The end 39 of the pipe 33 is connected to the outlet 40 of pipe 29 and left in place until the milking machine
30 rinse is finished. Thus pipe 33 acts as a milk return line.

Pipe 33 is then detached from milking line pipe 29 and allowed to drain.

For milking the vacuum line 21 is attached to vacuum pipe 19 and the milk line 27 is attached to the inlet line 25.

A 20 litre plastic jerry can 50 is located in the container 5 and the lid 11 is used to close the container with the outlet of the milk inlet pipe 29 being located within the spout of the jerry can. The milking machine cups are attached to the cow as normal and the colostrum is supplied to the jerry can 50 through milk line 27 and milk pipe 29 under a vacuum supplied through vacuum port 15 of the lid.

A plurality of containers 1 may be connected to the milking machine so as to fill a number of jerry cans simultaneously. When milking has finished, the cap on the jerry can is replaced and the jerry can containing the colostrum is refrigerated and stored cold. Where the container 50 has not been completely filled during a milking session, it may be returned to be further filled.

Figure 3 to 5 illustrate a further embodiment of the present invention. The container comprises a polypropylene body 105 having a vacuum port 107. The vacuum seal between the lid 111 and the body 105 is maintained by a U-shaped rubber seal 113 located over rim 115 of the body 105. The inlet 111 has stainless steel fitting 117 which allows connection to the fluid inlet line of the vacuum collection system. A stainless steel pipe or spout 119 extends from the inlet port 111 into the body of the container and is positioned so as to be located within the spout 210 of a plastic jerry can 200.

A stainless steel fitting 121 allows connection of the vacuum port 107 to the vacuum line of the vacuum collection system. A flexible plastic tube 123 is connected to the vacuum port and is terminated at the free end by a rubber tube 125. The internal diameter of the rubber tube 125 is such that to allow the tube 119 to be inserted therein with a fluid tight seal so as to allow flushing of the system as previously described. The plastic tube 123 is kept in position by a fused clip 127.

The body 105 has reinforcing ribs 129 and has a sloping wall 131 which slopes towards a drain hole 133. Drain hole 133 is a valve mechanism such as ball valve which is adapted to closing the outlet when a vacuum is applied to the container that opens when the vacuum is released and the internal pressure of the container approaches ambient pressure. By the provision of the sloping floor

any fluid collecting on the floor 131 may be drained out via a drain 133 minimising the possibility of bacterial growth of the base of the container.

In this particular embodiment, the container 100 is supported on a support 133 having dolly castors 135 providing mobility to the container. The container
5 also has polypropylene handles 137 and 139 to facilitate transporting of the container. Figure 4 is a side view along, 4' of Figure 3. It will be seen that the dimensions of the container is such to minimise the free space between the second container 200 and the walls of the container of the present invention. This is shown more clearly in Figure 5 which shows a plan view of the container
10 of the invention with the lid removed.

Although the invention has been described in reference to a particular embodiment, it will be clear to the skilled reader that other variations and modifications may be made without departing from the spirit and scope of the present invention.

Claims

1. A container suitable for use in the collection of a fluid using a vacuum collection system, the vacuum collection system including a fluid line adapted to communicate with a source of the fluid and a vacuum line for providing a vacuum, the container being substantially non-deformable under a preselected vacuum, the container including:
- 5 a base and an opening through which a second container may pass for containment in the container,
- a container closure adapted to sealingly close the container opening,
- 10 a fluid inlet port adapted to be connected to the fluid line; and
- a vacuum outlet port adapted to be connected to the vacuum line.
2. A container as defined in claim 1 including a drainage means located at or adjacent the base of the container.
3. A container according to claim 1 or claim 2 wherein the base or a portion of
- 15 the base of the container is sloped towards the drain means.
4. A container according to any one of the preceding claims wherein the drain means is located at or adjacent a side wall of the container, or in or adjacent a side wall of the container
5. A container according to any one of claims 2 to 4, wherein the drain means
- 20 include a drain closure means.
6. A container according to claim 4, wherein the drain closure means is activated to a closed position on application of a vacuum to the container.
7. A container according to claim 6, wherein the drain closure means is a valve, plug or diaphragm which is open under ambient pressure and activated by
- 25 the application of a vacuum to a closed position.
8. A container according to any one of the preceding claims wherein the inlet port has a spout, pipe or the like extending into the interior of the container.
9. A container according to any one of the preceding claims wherein the vacuum outlet port communicates with a pipe or tube extending into, or located in,
- 30 the interior of the container.
10. A container according to claim 9, wherein the pipe of the tube communicating with the outlet port is of sufficient length to allow the open end of

the pipe to be connected to the inlet port to provide a path for the line therebetween to be flushed.

11. A container according to any one of the preceding claims wherein the container includes means allowing the container to be moved.

5 12. A container according to claim 11, wherein the moving means is selected from wheels, castors or the like.

13. A container according to any one of the preceding claims wherein the vacuum collection system is a vacuum milking system.

14. A container according to claim 13 wherein the fluid collected is colostrum.

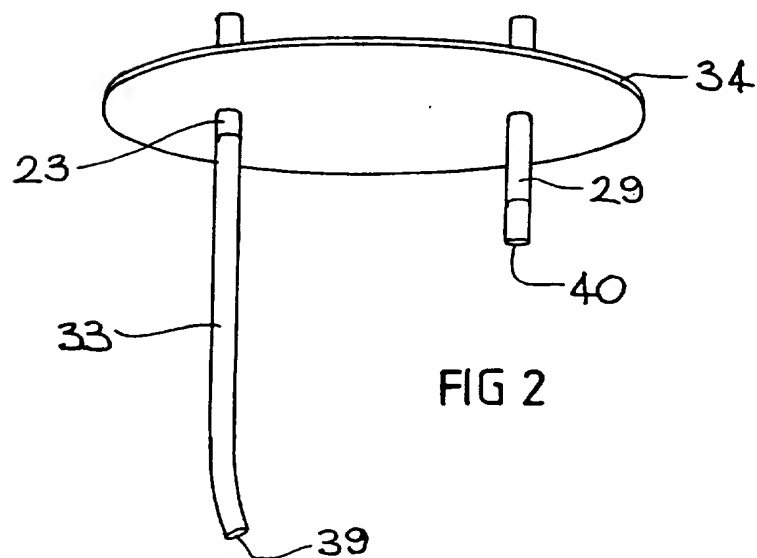
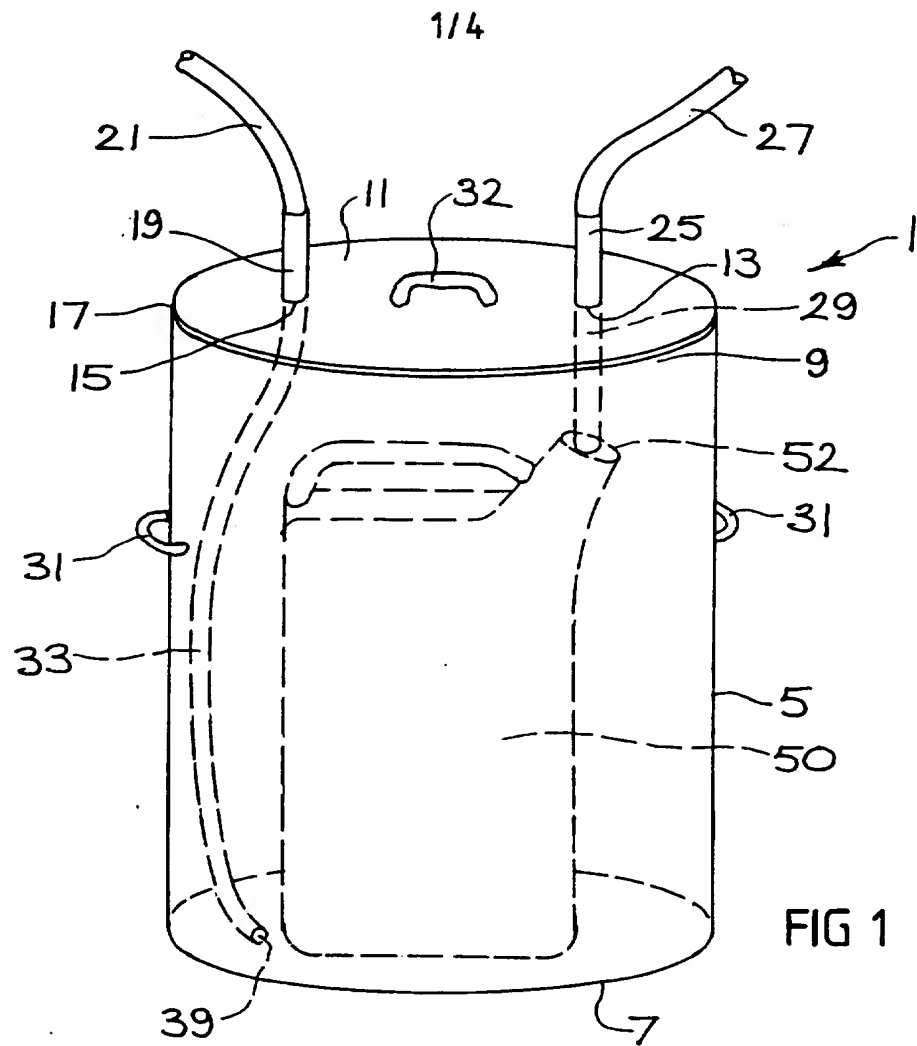
10 15. A combination of the container according to any one of the preceding claims and a second container located therein, the second container having an opening.

16. A combination according to claim 14, wherein the spout or pipe of the inlet port extends into the opening of the second container.

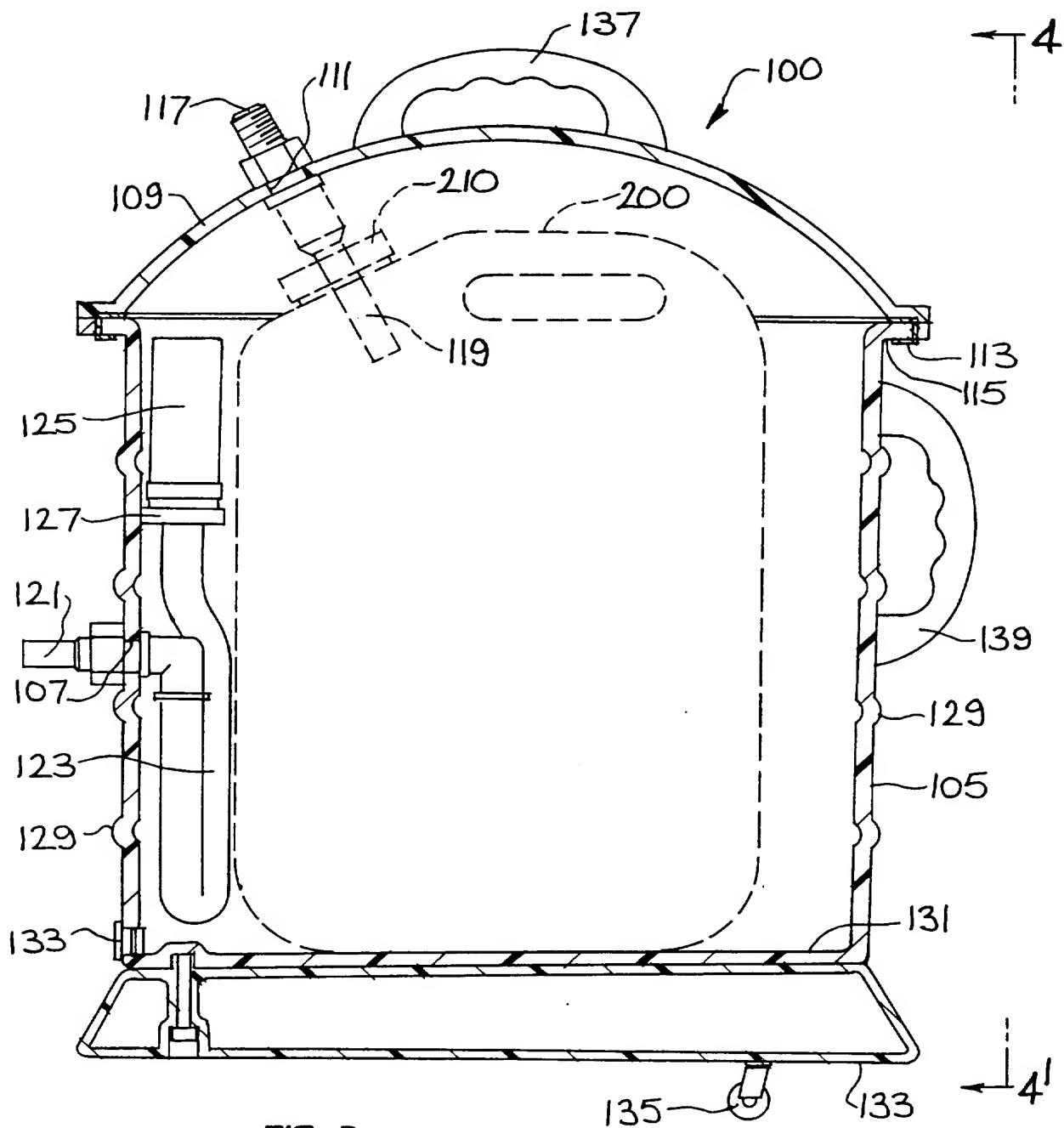
15 17. A combination according to claim 16 wherein the second container is deformable under the applied vacuum in the absence of the first container.

18. A container suitable for use in the collection of a fluid using a vacuum system substantially as herein described with reference to the accompanying drawings.

20 19. A method for collecting a fluid using a vacuum collection system including the use of a container in accordance with any one of the preceding claims.



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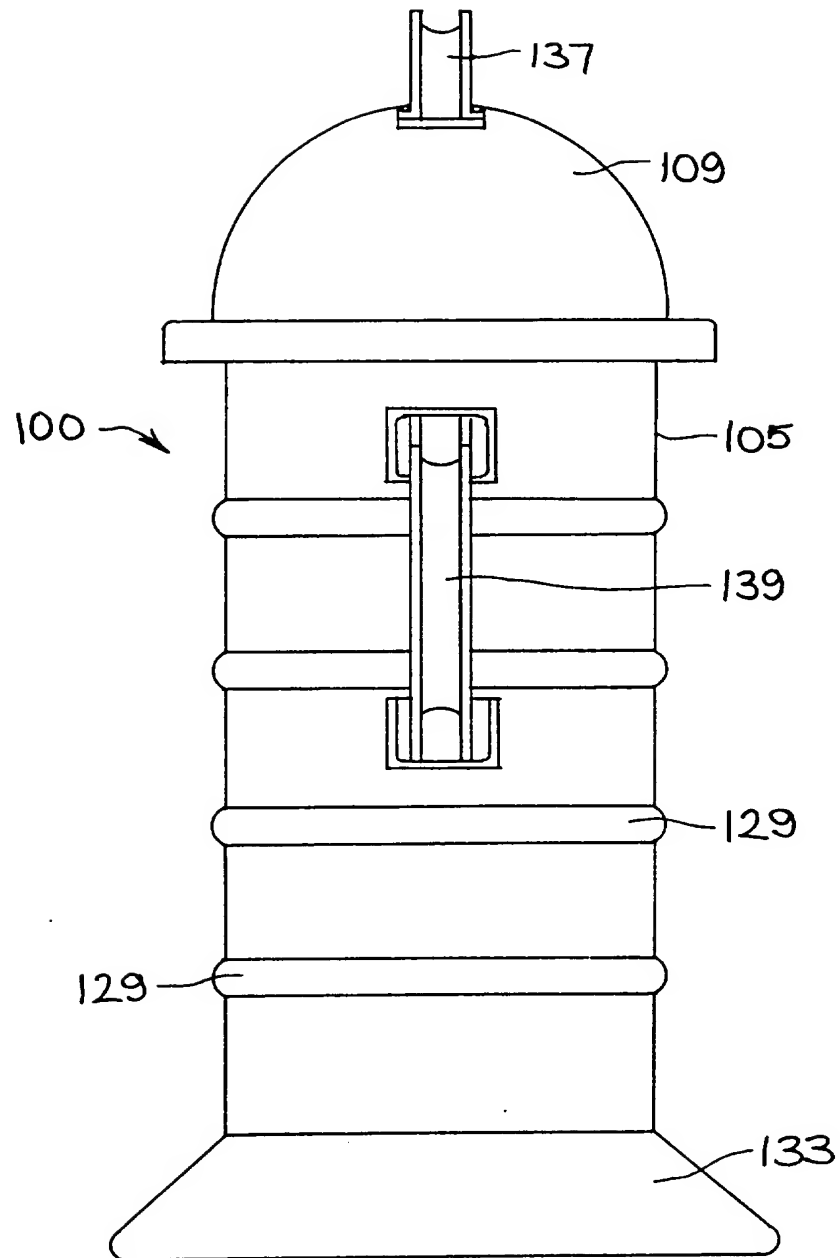


FIG 4

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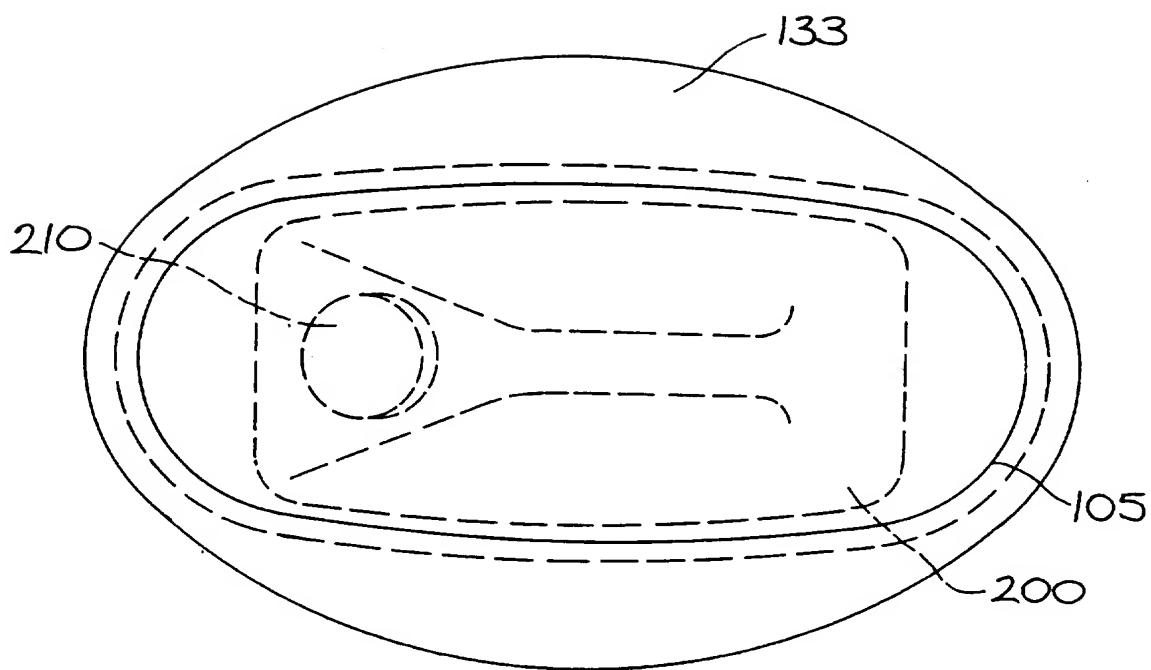


FIG 5

INTERNATIONAL SEARCH REPORT

International Application No.

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A. CLASSIFICATION OF SUBJECT MATTERInt Cl⁶: B67C 3/16 // A01J 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B67C 3/16; B65B 31/02

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DERWENT: B65B 31/02; B67D 5/01, 5/02 [VAC. or SUC or SUB] A01J 7/00

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	AU 16301/47 A (EKEM ENGINEERING) 11 December 1947 Figure 1 Vessel 13 suitable for use in collecting a fluid in a deformable container Figures 1 and 10 drainage valve 24	1-14, 18 2-7
X Y	AU 80549/91 A1 (TENKO) 9 January 1992 Figure 1 Vessel 6 suitable for use in collecting a fluid in a deformable container Mobile apparatus	1, 8-14, 18 13, 14
X Y	AU 83905/75 B1 (506829) (HEALTH TECHNOLOGY LABORATORIES INC) 17 February 1977 Figure 1 Vessel 5 with container 16 to be filled Mobile apparatus	1, 8-19 13, 14



Further documents are listed in the continuation of Box C



See patent family annex

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28 November 1995

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,Y	GB 922577 A (AGFA) 3 April 1963 Whole document	1-19
X,Y	GB 925564 A (ALBRO FILLERS and ENGINEERING) 8 May 1963 Whole document	1-19
X,Y	DE 1101200 A (STRUNCK & CO) 24 August 1961 Whole document	1-19
X	US 2982286 A (WELCH) 2 May 1961 Whole document	1, 8-19
Y	Mobile apparatus	13, 14
X	US 3032037 A (HUBER) 1 May 1962 Whole document	1, 8-19
Y	Mobile apparatus	13, 14